DIRECT TESTIMONY OF

RANDAL M. SENN

ON BEHALF OF

SOUTH CAROLINA ELECTRIC & GAS COMPANY

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Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS AND CURRENT POSITION.

A. My name is Randal M Senn. I am Chief Information Officer for SCANA Corporation ("SCANA"). My business address is 1426 Main Street, Columbia, South Carolina 29201. In this proceeding, I am testifying on behalf of South Carolina Electric & Gas Company ("SCE&G" or "Company").

Q. DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I graduated from the University of South Carolina with a Bachelor of Science degree in accounting. I began working for SCE&G in 1978. During my 31 years of service with the Company I have served in numerous leadership roles in accounting, customer billing, and shareholder services. I have also served as a project manager for SCANA's General Ledger System implementation, project manager for SCANA Year 2000 Compliance Project, and project manager for the information technology consolidation project associated with the merger between SCANA and Public Service Company of North Carolina. In 2001, I was named

General Manager of Information Services and Technology and in 2003, I was appointed to my current position as Chief Information Officer.

In 1999, I completed The Information Technology Management Course at the Georgia Institute of Technology and in 2001, I completed The CIO Academy at the University of South Carolina's College of Engineering and Information Technology.

Q. BRIEFLY SUMMARIZE YOUR CURRENT DUTIES AS CHIEF INFORMATION OFFICER.

A. As Chief Information Officer, I am responsible for managing, developing and implementing Information Technology ("IT") for SCANA, including SCE&G. I have responsibility for directing the Company's applications development efforts for new and existing business applications, leading enterprise IT initiatives and coordinating decisions related to the prioritization of all IT related initiatives. I also have responsibility for directing the development and maintenance of the Company's IT infrastructure and architecture, ensuring computer infrastructure and hardware are running properly and ensuring that proper and prudent ongoing investments are made. In addition, I am responsible for ensuring that all of the Company's IT activities are performed in compliance with regulatory requirements, client service standards and approved corporate policies.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. On March 4, 2009, the Public Service Commission of South Carolina ("Commission") issued a Notice of Filing stating that the South Carolina Office of

Regulatory Staff had filed an Amended Petition to Establish a Docket to Consider Implementing the Requirements of Section 1307 (State Consideration of Smart Grid) and Section 532 (Energy Efficiency Programs) of the Energy Independence and Security Act of 2007 ("EISA"). The purpose of my testimony is to discuss with the Commission whether it is necessary to adopt the standards for electric utilities as set forth in Sections 1307(a)(16) and (17) of the EISA.

Q. WHAT IS REQUIRED BY SECTION 1307(a)(16)(A) OF THE EISA CONCERNING SMART GRID INVESTMENTS?

A. With respect to this first set of Smart Grid standards, the EISA requires as follows.

> Each State shall consider requiring that, prior to undertaking investments in nonadvanced grid technologies, an electric utility of the State demonstrate to the State that the electric utility considered an investment in a qualified smart grid system based on appropriate factors, including (i) total costs, (ii) cost-effectiveness, (iii) improved reliability, (iv) security, (v) system performance, and (vi) societal benefit.

[EISA Section 1307(a)(16)(A)]

Section 1307(a)(16)(B) of the EISA discusses rate recovery and requires as follows.

> Each State shall consider authorizing each electric utility of the State to recover from ratepayers any capital, operating expenditure, or other costs of the electric utility relating to the deployment of a qualified smart grid system, including a reasonable rate of return on the capital expenditures of the electric utility for the deployment of the qualified smart grid system.

[EISA Section (a)(16)(B)].

Finally, with respect to equipment that becomes obsolete upon the implementation of any Smart Grid system, Section 1307(a)(16)(C) of the EISA states as follows.

> Each State shall consider authorizing any electric utility or other party of the State to deploy a qualified smart grid system to recover in a timely manner the remaining book-value costs of any equipment rendered obsolete by the deployment of the qualified smart grid system, based on the remaining depreciable life of the obsolete equipment.

[EISA 1307(a)(16)(C)].

Q. PLEASE DEFINE WHAT IS MEANT BY THE TERM "SMART GRID."

A. There are several definitions of Smart Grid, but essentially, it is the application of digital technology focused primarily at the delivery and end-use sectors of the electric industry. More specifically, it is the integration of information technology, communication networking, extensive distributed control devices and digital metering infrastructures to modernize and optimize the electric power system infrastructure. Another way to define and thereby understand the term Smart Grid is in terms of its most fundamental characteristics, as opposed to the specific technologies it will employ. For example, the National Energy Technology Laboratory on behalf of the United States Department of Energy developed a defining set of seven key characteristics of a Smart Grid. These seven Smart Grid characteristics are:

1. **Self-healing.** Detects and responds to routine problems and quickly recovers if they occur, minimizing downtime and financial loss.

2. **Motivates and Includes the Consumer.** Commercial, industrial and residential electric consumers will have visibility into prices and the ability to choose a program and a price that best suits their needs.

3. **Tolerant of Attack.** A grid that mitigates and stands resilient to physical and cyber security attacks.

4. **Provides power quality needed by 21st century needs.** A grid that provides a quality of power consistent with consumer and industry needs.

5. **Accommodates a wide variety of generation and storage options.** Allows plug-and-play interconnection to practically any source of power, including renewable energy sources and storage.

6. **Fully enables maturing electric markets.** Provides for consistent operations from coast to coast while allowing innovation locally and regionally.

7. **Optimizes Assets and Operates Efficiently.** Allows utilities to put more power through existing systems, build less new infrastructure and spend less to operate and maintain the grid.

Q. HOW IS SCE&G APPROACHING THE EVALUATION AND PLANNING FOR SMART GRID MODERNIZATION?

A. In early 2008, SCE&G formed an exploratory committee to study the issues and opportunities concerning a Smart Grid. Knowing that Smart Grid technology would impact several different areas within SCE&G, the committee was comprised of personnel from the areas of (i) customer service, (ii) meter

operations, (iii) communications, (iv) information services and technology, (v) generation planning, (vi) demand-side management, (vii) electric distribution services and (viii) electric transmission services. Later in 2008, a subset of the committee was formed to become the basis for the steering function of this overall effort. The steering committee's first goal was to review and assess SCE&G's "as-is" state of initiatives already underway that fit many of the Smart Grid goals and objectives; initiatives that SCE&G began before the term Smart Grid became popularized. After evaluating SCE&G's current state concerning Smart Grid technology, the Company evaluated the maturity, feasibility and supportability of the current Smart Grid related industry solutions and technologies.

Q. HOW WOULD A SMART GRID SYSTEM DIFFER FROM THE GRID CAPABILITIES OF SCE&G'S CURRENT SYSTEM?

A. SCE&G has deployed technology in recent years which contain Smart Grid capabilities. Generally, descriptions of Smart Grid technology prescribes some type of near real-time, two-way communication capability with the customer about their electric consumption information which is designed to enable these customers to better manage electricity usage within their homes and/or businesses. In its most visionary mode, a Smart Grid could also be the electric control mechanism for load management at a customer's premises either at the discretion of the utility or the customer. At SCE&G, the Company's large commercial and industrial customers have access to fifteen (15) minute interval meter data in a near real-time fashion via the internet. The large majority of SCE&G's other

customers have meters that are currently read once a month and these customers can view their usage history on their paper bill statement or on SCE&G's website. In the near future, the Company expects to pilot the use of in-home display devices. These devices read directly from the customer's meter and provide customers with electric usage information and trending. Today, all control of electric usage is under the customer's direct control.

A Smart Grid is capable of communicating at the distribution grid level thereby supporting the incorporation of distributed electric generation into the grid produced from renewable energy sources, assisting with electric system dispatch and reliability, remote meter reading and isolating outage locations remotely. At SCE&G today, the Company has about sixteen (16) customer-owned, distributed generation facilities on its electric system. When generating power under normal conditions, almost all of those units' generating capacity is consumed at its own location thus creating a negligible effect to any grid operation. Until such time as there appear to be large numbers of renewable energy sources combined with some sort of energy storage mechanism, dispatchable load control is not an issue at SCE&G. The Company has extensive experience today with co-generation arrangements, small independent power providers, and emergency generator contingency plans on the supply side and curtailment plans on the demand side that are distributed in nature and are easily handled today without expensive additional infrastructure.

A Smart Grid is also typically known for its use of digital meters. SCE&G's meters are digital. Generally, the definition of a Smart Grid incorporates two-way communication capabilities with customers. SCE&G plans to pilot two-way communications to its customers over a broadband internet connection. Smart Grid definitions also describe the ability to capture multiple meter readings per day to support time-of-use rates. Today, for the majority of our residential customers, SCE&G collects monthly meter reads. SCE&G is currently piloting a fixed network system that will allow the Company to capture multiple meter readings per customer each day in support of time-of-use rates.

Definitions of a Smart Grid also describe extensive use of monitors and sensors throughout the transmission and distribution systems. SCE&G has thousands of sensors throughout its grid and metering environment and hundreds of remotely controlled Supervisory Control and Data Acquisition ("SCADA") devices.

Definitions of a Smart Grid also claim semi-automatic restoration to self healing capabilities. SCE&G has a great deal of fault isolation and detection capabilities within its existing SCADA and Outage Management System. Moreover, SCE&G has implemented a limited number of distributed smart switching devices into its grid for certain critical facilities like hospitals.

Q. WHAT IS SCE&G's APPROACH TO "SMART METERS"?

A. Many discussions around Smart Grid focus on metering and supplying information to customers to allow them to better understand their energy usage.

As of July 1, 2009, SCE&G was 71% complete with the deployment of an Automatic Meter Reading ("AMR") system. Over 690,000 electric and gas meters have been replaced with AMR technology. SCE&G chose to deploy this system after much research and many field tests of several different technologies. Since SCE&G is both an electric and gas utility, the Company was required to find a solution that supports both electric and gas meters. The benefits of the implementation of the AMR system were primarily operational and safety related. Currently, the majority of the Company's AMR meters are read monthly using a drive-by or walk-by process. The electric AMR meters do not have two-way communication capabilities, but currently transmit status/read information every thirty seconds.

Automatic Meter Infrastructure ("AMI") technology was evaluated by the Company but deemed unacceptable at the time because of the additional costs, its technological maturity and concerns for supporting both electric and gas requirements. However, many of the benefits of an AMI system may be realized by leveraging AMR technology. SCE&G is beginning a twelve-month field trial of a fixed network system in several locations in the metropolitan Columbia area to determine the feasibility, costs and benefits of a large scale implementation. The fixed network may provide many of the benefits of an AMI system at a substantially reduced cost utilizing the existing AMR meters. The fixed network system will collect interval usage data, issue tamper alerts and outage notifications and transmit this information to a central repository. The usage data can be used

for load research, development of new rates and provide customers with a more detailed representation of their energy consumption. SCE&G also plans to improve its outage notification and restoration processes by utilizing this information.

Information can also be made available to the customer via an in-home display or gateway. These devices read and interpret the transmissions from the meter and can either display the data or pass it on to a collection system in the customer's home. These devices can display both usage and cost information. The main functionality that would not be available without additional equipment is the ability to manage remote connect/disconnect and load control. Connection/Disconnection can be accomplished by the addition of a meter collar with its own communication mechanism and could be deployed if justified. There are technologies being developed that will allow access and control of customer's smart appliances. While this could be accomplished through an AMI infrastructure by way of a communications network connected to the AMI meter, an alternative approach would be to utilize an existing broadband connection to the premise in conjunction with 3rd party devices. SCE&G is evaluating the feasibility of technologies in this area.

Q. WHAT IS THE CURRENT STATUS OF SMART GRID TECHNOLOGY?

A. There are multiple hardware and software components that make up an integrated Smart Grid system. Some of the key components or building blocks for a Smart Grid have been evaluated and tested (such as the smart meter) and could

be installed today with limited application. But other components, such as two-way demand response through a smart meter, grid automation, and the software to integrate utility systems are not fully developed and may not be available for large scale implementations at this time. However, the development of Smart Grid pilot systems is ongoing throughout the country. Many industry experts believe over time, as these pilot programs prove out the technology, system infrastructure costs become better defined, system functionality matures and security issues are addressed, that Smart Grid systems could become the standard infrastructure model.

Q. CAN A SMART GRID SYSTEM HELP PROMOTE ENERGY EFFICIENCY AND DEMAND RESPONSE OPTIONS AT THIS TIME?

A. Possibly, although the experience in this area is rather limited to date. To explain, AMI with two-way customer communication is considered a critical component of Smart Grid by many utility experts to enable customer initiated demand response type programs. To fully enable AMI and demand response type programs requires a communication network that links individual meters and provides two-way data flow with the utility's operation centers. At the utility level, there must be computer software and storage capacity to collect and organize large amounts of data and to enable real-time interactions between the utility and its customers. At the present time, some of the AMI infrastructure needs may not be fully developed for commercial application. Moreover, absent further experience it is unknown how customers will respond to these efficiency

initiatives. An example of real-time interaction with customers utilizing a two-way communication system is interruptions to air conditioning units to reduce peak demand. At the present time there is little experience to quantify customer acceptance and utilization of this technology. Moreover, historical evidence with similar radio controlled based programs did not prove as acceptable to customers as predicted. Consequently, while there is hope that a Smart Grid system will enable customers to increase their participation in demand response type programs, until further research and testing is done it is uncertain how successful these initiatives might be in a Smart Grid environment.

Q. GIVEN THE ENERGY EFFICIENCY AND OTHER PROMISING FEATURES OF A SMART GRID SYSTEM, IS IT IN THE CUSTOMERS' INTEREST TO REQUIRE DEPLOYMENT OF SMART GRID AT THIS TIME?

A. No. Requiring Smart Grid deployment at this time would be an extremely costly undertaking with uncertain benefits. For example, the costs and benefits of AMI for some conventional utility operations such as remote meter reading can be determined with some certainty, while research into demand response and other benefits are ongoing. Many of the benefits of AMI can also be provided by leveraging current AMR deployments. Until additional cost-benefit analysis is completed, it is impossible to conclude that an advanced AMI Smart Grid system is cost-justified over a conventional system or current AMR deployments. In addition, experience has indicated that there may be cyber security concerns with

some parts of the Smart Grid technology solution. Until such time as these infrastructure systems are reasonably mature and cost effective to support commercial application, it would be unwise to require a system-wide Smart Grid investment at this time.

Q. DOES THE COMPANY HAVE ANY CONCERNS WITH THE PROPOSED STANDARD THAT IT PROVIDE AN EVALUATION THAT CONSIDERED USING SMART GRID TECHNOLOGY FOR NEW GRID INVESTMENTS?

A. The Company does have a concern with this particular section of the proposed standard for several reasons. First, the standard requires that the economic evaluation include total costs, cost-effectiveness, and societal costs. As discussed above, the cost savings or benefits from a Smart Grid system rely in part on customer-based demand response programs, yet there is insufficient evidence to determine the level of these energy usage savings and related costs. Further, attempting to estimate any societal benefits, as called for in the proposed standard, is unrealistic absent an accurate assessment of energy savings, which is impossible at this time. There is also insufficient evidence to calculate if there is improved reliability, improved system performance, or improved security at this time, and yet the proposed standard requires that all of this information be considered in the evaluation of a Smart Grid investment. Therefore, the Company believes that it is too early in the development of Smart Grid systems to adopt an economic analysis

standard that is impossible to comply with at this time, simply due to the fact that the economic data is not available.

Q. SHOULD THE COMMISSION ADOPT THE PROPOSED SMART GRID INVESTMENT STANDARD?

A. No. The Company agrees that the principles expressed in this standard are generally reasonable and that if the Commission required the development of a Smart Grid infrastructure that the cost should be fully recoverable. However, the Company is concerned that the adoption of this standard at this time is premature, given the current state of Smart Grid technology. This makes complying with the economic evaluation criteria in the proposed standard fraught with unknown and unsupportable economic assumptions. Therefore, the Company recommends as an alternative to the adoption of this Smart Grid standard that the Commission and the Company continue to monitor the evolution of Smart Grid developments, and at an appropriate time in the future, if necessary, hold hearings to establish standards at that time.

If the Commission chooses to adopt this proposed standard, then the Company recommends that the Commission modify the language to make it more appropriate to South Carolina and the current state of the technology. The language to be modified relates to the requirement that a utility provide an economic analysis considering a Smart Grid system over conventional technology. The Company suggests it would be unwise to delay system infrastructure build-out in fast growing areas of South Carolina while the Commission waits for an

economic evaluation of a Smart Grid system when the costs and expected benefits of such a system are hard to quantify or simply unknown at this time. This is particularly true when one attempts to quantify the benefits associated with demand response programs and societal benefits. The Company would also recommend that this economic evaluation language in the proposed standard reflect these circumstances by requiring an economic evaluation based on only known, quantifiable costs and known, quantifiable benefits.

Q. WHAT IS REQUIRED BY THE EISA SECTION 1307 (a)(17) WITH RESPECT TO THIS SMART GRID INFORMATION STANDARD?

A. This section of the EISA requires that all electricity purchasers shall be provided access, either written or electronic, concerning the following:

> (i) Prices - Purchasers and other interested persons shall be provided with information on—
>
> > (I) time-based electricity prices in the wholesale electricity market; and
> > (II) time-based electricity retail prices or rates that are available to the purchasers.
>
> (ii) Usage- Purchasers shall be provided with the number of electricity units, expressed in kwh, purchased by them.
>
> (iii) Intervals and projections -Updates of information on prices and usage shall be offered on not less than a daily basis, shall include hourly price and use information, where available, and shall include a day-ahead projection of such price information to the extent available.
>
> (iv) Sources - Purchasers and other interested persons shall be provided annually with written information on the sources of the power provided by the utility, to the extent it can be determined, by type of generation, including greenhouse gas emissions associated

with each type of generation, for intervals during which such information is available on a cost-effective basis.

(C) Access - Purchasers shall be able to access their own information at any time through the Internet and on other means of communication elected by that utility for Smart Grid applications. Other interested persons shall be able to access information not specific to any purchaser through the Internet. Information specific to any purchaser shall be provided solely to that purchaser.

[EISA Section 1307(a)(17)].

Q. CAN A SMART GRID SYSTEM DELIVER THE INFORMATION PROPOSED BY THE STANDARDS?

A. Possibly, but given the current state of technology it is unclear how much of this information can be delivered to the customer, whether the customer wants the information, and how much it will cost. For example, the ability to deliver pricing, usage, and interval data on a near real-time basis (hourly) to all customers is predicated on the implementation of a metering system with two-way communications between the smart meter and an in-home display device. Various components required to deliver this level of detail may neither be fully developed at this time nor is their costs and benefits. While at the present time SCE&G assumes that this level of customer information will be routinely available and desired in a Smart Grid system, customer acceptance and costs could dictate otherwise. Therefore, adopting this standard as a requirement may be premature at this time.

With respect to providing information related to sources of generation, much of this information is contained within the Company's Form 1 which

contains utility operations data and is filed annually with the Federal Energy Regulatory Commission. However, it should be noted that some portion of the energy that the Company delivers to its retail customers is purchased from other providers who receive their energy from various operators in multiple states. These other suppliers are generally either unable or unwilling to indicate the ultimate sources that they relied upon to generate the energy sold to the Company. Therefore, SCE&G would not be able to accurately and completely comply with this proposed requirement at this time, nor would a Smart Grid infrastructure necessarily allow the compilation of this information. Moreover, it is unclear how many customers desire to know which generator or what type generator produced the electricity they used last year.

With respect to providing information related to greenhouse gas emissions, the aforementioned non-SCE&G supplier information would prevent a complete and accurate development of this data.

Q. DOES THE COMPANY BELIEVE THAT THE COMMISSION SHOULD ADOPT THE PROPOSED SMART GRID INFORMATION STANDARDS?

A. SCE&G is not opposed to the intent of this standard. However, as discussed above, it is premature at this time to establish information standards when it is still unclear what final Smart Grid technologies will prove cost effective and desired by customers. Also, it will be impossible to supply some of the generation information being proposed by the standards because it is simply impossible to dictate to outside energy suppliers that they provide the information

required under this standard. Therefore, no matter the willingness of the Company it is simply impossible to comply with all of the requirements of the proposed standard, with or without a Smart Grid system.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.